

Environmental Protection Agency

Vehicle Inspection and Acceptance Procedure

This procedure is written for the Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory (NVFEL) internal use. The use of specific brand names by NVFEL in this procedure are for reference only and are not an endorsement of those products. This document may be used for guidance by other laboratories.

NVFEL Reference Number

701K

Implementation Approval

Original Procedure Authorized by EPCN #096 on 12-14-1992

Revision Description

- (1) 02-01-99 The purpose of this change is to revise the procedure as described in EPCN #228.
- (2) 02-16-2001 The purpose of this change is to revise the procedure as described in EPCN #291.

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1. Purpose

The purpose of this test procedure is to ensure that a test vehicle delivered to the National Vehicle and Fuel Emissions Laboratory (NVFEL) by a manufacturer is properly prepared and acceptable for emission testing by the Vehicle Testing (VT) group.

2. Test Article Description

1993 and later model year Light-Duty Certification and Fuel Economy Data Vehicles

3. References

- 3.1 "Code of Federal Regulations," Title 40, Subpart A, Sections 86.082, 86.084; Subpart B, Sections 86.126, 86.130, and 86.142
- 3.2 Mobile Source Air Pollution Control (MSAPC) Advisory Circular No. 23B, June 6, 1990
- 3.3 Environmental Protection Agency (EPA) current safety policies
- 3.4 Memo, David Bochenek, November 18, 1991; Subject: "Quality Assessment of Platform Weigh Scale"
- 3.5 Memo, David G. Garter, July 5, 1994; Subject: "Freedom of Movement"

4. Required Equipment

- 4.1 Toledo Platform Scale, Model 8146
- 4.2 Panasonic Printer, Model KX-P1180
- 4.3 Allen BAR 4-Gas Analyzer or equivalent
- 4.4 OTC Digital Timing Light, Model #3375
- 4.5 Monarch Phototach or Pioneer Stroboscope or equivalent for diesel inspection
- 4.6 1.5-ton Hydraulic Floor Jack

- 4.7 Omega Type J Digital Thermometer, Model HH81 or equivalent
- 4.8 Wheel Chock Blocks
- 4.9 Jack Stands
- 4.10 Oil Rag Dispenser/Can
- 4.11 Exhaust Dump and Hose
- 4.12 Floor "Creeper"
- 4.13 Test Documentation Package (see list in Step 7.2 for details)
- 4.14 "Vehicle Specification Report" (VSR) (Attachment A)
- (2) 4.15 Axle Ratio Chart (Attachment B)
- 4.16 Certification Testing Schedule (Attachment C)
- (2) 4.18 Form 701-01, "Certification Program Requirements" (Attachment D)
- 4.17 Form 701-02, "Vehicle Inspection" (Attachment E)
- 4.19 "Vehicle Weight Verification Flow Chart" (Attachment F)
- 4.20 Form 708-01, "Vehicle Test Data Sheet" (see TP 708)
- 4.21 "Certification Weekly Test Log"

5. Precautions

- 5.1 When working under the vehicle hood with the engine running, special care must be taken to avoid personal injury or equipment damage from rotating fans, fan belts, and pulleys.
- 5.2 When inspecting a vehicle, the parking brake must be set and wheel chocks must be placed in front of and behind one of the drive wheels to prevent movement.

- 5.3 If outdoor hazardous conditions exist, such as snow, ice, or limited visibility, special care must be taken when test vehicles are moved. Vehicles may not be driven if visibility is obscured by any such conditions.
- 5.4 Any cloth or paper towels used to check oil levels or wipe oil spots must be disposed of in the red trash container marked "Flammable Waste."
- 5.5 Safety precautions must be followed when using compressed gases. Carbon monoxide (CO) is toxic.
- 5.6 When not in use, leave the Allen BAR 84 analyzer in the "Main Menu." This will enable the system screen saver.
- 5.7 Under no circumstances are inspectors to make adjustments to test vehicles. Such adjustments are to be made only by the appropriate manufacturer's representative and must be authorized and witnessed by an EPA Certification Division representative.

6. Visual Inspection

Visual inspections are incorporated in Sections 7 and 8 of this test procedure.

7. Test Article Preparation

The vehicle inspector is responsible for completing the following preparatory steps and checking off each of the steps on Form 701-02.

The symbols < > are used to indicate a key on the chart recorder keyboard.

Example: Push <1> to start. This means you need to push the key labeled "1" to start the recorder.

- 7.1 Obtain the test vehicle keys and Form 708-01.

- 7.1.1 Verify that the data on Form 708-01 are coded correctly for the test type and test procedure, one entry for each:

Test Types (Row A, Cols. 21-22)

01 - Emission Data

02 - Durability

31 - Fuel Economy Data

Test Procedure (Row A, Cols. 25-26)

02 - CVS 75-LATER

03 - HWFE

- 7.1.2 Verify that the VI Version on Form 708-01 (Row A, Cols. 64-65) matches the VI Version on the Certification Testing Schedule. Each vehicle is identified in a box under the scheduled test day. The version number is located in the upper right-hand corner of this box.
 - 7.1.3 Verify that the vehicle identification number on the keys matches the number on the VSR.
 - 7.1.4 Report any discrepancies or missing data immediately to a VT senior technician. Do not proceed with the inspection until all discrepancies are resolved.
- 7.2 Verify that the documentation package contains the following forms:

For non-diesel vehicles tested for 1978 Regulations:

- Form 701-01, "Certification Program Requirements" (Attachment D)
- Form 701-02, "Vehicle Inspection" (Attachment E)
- Form 703-01, "Vehicle Preconditioning" (see TP 703)
- Form 704-01, "Diurnal Heat Build-No Evap" (see TP 704)
- Form 707-01, "Sample Collection/Analysis Site Verification" (see TP 707)

For non-diesel vehicles tested for 1996 Enhanced Evaporative Regulations:

Same as above and:

- Form 717-01, "Enhanced Evap Process and Required Times" (see TP 717)
- Form 717-02, "Enhanced Diurnal Evaporative Emission Test Checklist (see TP 717)
- Form 720-01, "Canister Preconditioning" (see TP 720)

For diesel vehicles:

- Form 701-01, "Certification Program Requirements" (Attachment D)
- Form 701-02, "Vehicle Inspection" (Attachment E)
- Form 703-02, "Diesel Vehicle Preconditioning" (see TP 703)
- Form 707-01, "Sample Collection/Analysis Site Verification"
- Form 708-01, "Vehicle Test Data Sheet"

Note: Form 704-01 is included in the packet if the vehicle is scheduled for a Diurnal Heat Build No-Evap Test. Form 707-01 is used again if the vehicle is scheduled for a Highway Fuel Economy Test.

- 7.3 At the top center on the front of a 9.5-by 12-inch brown envelope, record the vehicle manufacturer, identification number, and test type. In the upper right-hand corner on the front of the same envelope, record the Federal Test Procedure (FTP) test number. In the upper left-hand corner of the envelope, record the test date. This envelope will be used to store all completed test documentation.
- 7.5 On Form 701-01, record the fan location and position. If required, record the location and position of the extra cooling fan.
- 7.6 Coordinate special instructions, VDA drive schedules, required preconditioning and tests to be performed with the EOD vehicle test scheduler.

If the vehicle is being inspected according to the 1978 test sequence, under the 1978 column of Form 701-01, record the VDA shift codes, select single or double PREP, and place check marks next to the required tests. See 40 CFR 86.130, "Figure B78-10 Test Sequence," for 1978 testing requirements.

If the vehicle is being inspected for an FTP exhaust emission test according to the 1996 test sequence, under the 1996 column of Form 701-01, record the VDA shift codes and, select the appropriate PREP type and the appropriate 2-Day or 3-Day test sequences. Do not select items for the "3-day Test Sequence" if you have selected items for the "2-Day Test Sequence." See 40 CFR 86.130, "Figure B96-10 Test Sequence," for 1996 testing requirements.

- 7.7 Place Form 701-01 on the front of the clipboard.
- 7.8 Allen 4-Gas Analyzer Calibration/Leak Check:

The Allen 4-Gas analyzer uses a keypad located on the front cabinet to the right of the display screen. Use this keypad to maneuver through the various menus and to perform calibration and test functions.

To select a menu option, press the corresponding number and press the <Enter> button. To delete an entry press the <Delete> button until all erroneous information has been cleared. To return to the previous menu, press the <Menu Options> button.

- 7.8.1 To select "Service" from the "Main Menu," press <3> and <Enter>.
- 7.8.2 Type in the service access number, 4444, and press <Enter>.

- 7.8.3 To select “Calibration/Leak Check” from the “Service Menu,” press <2> and <Enter>. The unit will automatically zero the analyzer.
- 7.8.4 Upon completion of the zero set, the computer will prompt the operator to turn on the calibration gas by turning the high pressure gas bottle valve counterclockwise approximately $\frac{1}{4}$ to $\frac{1}{2}$ turn. After completing the task, press <Enter> to continue the calibration.
- 7.8.5 Upon completion of the calibration, the computer will prompt the operator to turn off the calibration gas by turning the high pressure gas bottle valve clockwise until snug. Press <Menu Options> to proceed with the leak check.
- 7.8.6 Allow the unit to obtain its reference reading. The 3-way valve on the probe should be set to sample from the probe tip, i.e., the arrow on the handle should be pointing toward the probe tip.
- 7.8.7 After the unit has obtained its reference value, the computer will prompt the operator to “cap” the end of the exhaust probe by turning the 3-way valve 90° ($\frac{1}{4}$ turn). Press <Enter> to continue with the leak check.
- 7.8.8 The unit will indicate on the display screen if the leak check was successful. If it was not successful, select “1” and press <Enter> to retest. Ensure that the 3-way valve is set as described in Steps 7.4.6 and 7.4.7.
- If after three attempts you are unable to successfully pass a leak check, inspect the hoses, clamps, and fittings on the sample line and probe. If you are unable to determine the source of the problem or are unable to pass a calibration leak check, notify a VT senior technician.
- 7.8.9 Return to the “Service Menu” by pressing the <Menu Options> button.
- 7.9 Upon their arrival at NVFEL, ensure that all manufacturers’ representatives have received a copy of the “Freedom of Movement” memo.

8. Test Procedure

100 Visual Inspection

- 101 Locate the test vehicle.

- 102 Using the manufacturer's recommended starting procedure, start the test vehicle.

If the vehicle fails to start after 10 seconds of cranking, pause for 10 seconds before cranking again. Not more than four 10-second cranks, each separated by a 10-second pause, may be attempted. If the vehicle fails to start after the fourth attempt, contact and notify a Certification Division representative.

- 103 Drive the test vehicle to the inspection station. Park the vehicle in the inspection room and shut off the engine. Chock the non-drive tires.

- 104 Ensure that the VSR data match the information supplied by the manufacturer. The information must be displayed in or on the vehicle in a manner that permits the data to be read from outside the vehicle.

The manufacturer information must include the following:

- Vehicle Identification Number
- Vehicle Version Number
- Location of the fuel tank drainage valve
- Location of the fuel filler door release
- The basic ignition timing and method of reading timing (if it can be checked)

If this information is not present, notify a Certification Division representative.

- 105 On Form 701-02, record the Vehicle ID and Test Number.

- 106 On Form 701-02, record the vehicle odometer mileage. If the odometer indicates that the vehicle has over 10,000 miles (16,000 kilometers), contact the Certification Division representative. Certification test vehicles with mileage over 10,000 miles cannot be used for fuel economy tests.

If the vehicle is being retested and it has not left the EPA grounds, check "Retest" and go to Step 600.

- 107 Visually check and record that the vehicle has a permanently affixed Marmon mounting flange (or an equivalent) exhaust adapter. Appropriate equipment would be a 2.5-inch Aeroquip Service-Master exhaust flange or equivalent.

If the exhaust flange is acceptable, place a check mark in the "YES" column on Form 701-02.

If the vehicle does not have a flange or does not meet EPA requirements, place a check mark in the "NO" column on Form 701-02 and notify a Certification Division representative.

- 108 Connect the exhaust probe adapter to the tailpipe. If the adapter does not fit correctly, notify a Certification Division representative.
- 109 Connect the black exhaust tubing to the probe adapter. Ensure that this tube is connected to the outlet blower and the motor is on.
- 110 Ensure that the vehicle is equipped with a fuel drain and that an adapter fitting is provided if one is needed.

If an acceptable fuel drain is present, place a check mark in the “YES” column on Form 701-02.

If it is not acceptable, place a check mark in the “NO” column on Form 701-02 and notify a Certification Division representative.

Note: If unusual locations are identified for the fuel filter door, fuel tanks, fuel drains, or thermocouples, the information should be noted and placed on the steering column.

- 111 If the vehicle is gasoline-fueled, ensure that it is equipped with the required fuel tank thermocouple. For vehicles with a primary and an auxiliary fuel tank, a thermocouple must be provided for each tank. If the vehicle is diesel-fueled, place a check mark in the “NA” column on Form 701-02 and proceed to Step 113.

A type-J thermocouple terminating in a male type-J plug must be installed to measure the temperature of the fuel in the fuel tank. Each thermocouple should have a minimum of 8 inches of wire extending from the male plug end to the point where the wire enters the vehicle.

Use the Omega Type-J Digital Thermometer to test each thermocouple. If the thermocouple is working properly, the thermometer digital readout will display a temperature close to ambient conditions or hotter if the vehicle is warm.

If a thermocouple is installed and working properly, place a check mark in the “YES” column on Form 701-02. If it is not installed or not working properly, place a check mark in the “NO” column on Form 701-02 and notify a Certification Division representative.

- 112 If the vehicle is equipped with its own fuel tank heating apparatus, verify that it is equipped with a standard 110-120 VAC 3-prong plug compatible with EPA temperature achievers.

If the vehicle is not equipped with a fuel tank heating apparatus, place a check mark in the "NA" column on Form 701-02. If it is equipped with the correct electrical plug, place a check mark in the "YES" column on Form 701-02.

If it is not equipped with the correct plug, place a check mark in the "NO" column of 701-01 and notify a Certification Division representative.

- 113 If the vehicle has front-wheel drive, ensure that it is equipped with two hold-down eyelets, securely fastened to the vehicle's frame or bumper. These eyelets must be located on each side of the vehicle, forward of the front wheels and at least 6 inches outboard of the vehicle center line.

Rear-wheel drive vehicles which do not have bumpers adequate for vehicle restraint must be provided with hold-down eyelets securely fastened to the vehicle frame.

If hold-down eyelets are present and meet the above requirements, place a check mark in the "YES" column on Form 701-02.

If hold down eyelets are not present or do not meet the above requirements, place a check mark in the "NO" column on Form 701-02 and notify a Certification Division representative

- Note:** Some rear-wheel drive vehicles with no tie-downs may use the airplane style chock blocks to prevent movement.

- 114 Open the hood and ensure that the vacuum lines, canister hoses, air cleaner hoses, heat riser, and other equipment are properly connected.

If all the equipment is properly connected, place a check mark in the "YES" column on Form 701-02.

If any of the equipment is not properly connected, do not connect it; place a check mark in the "NO" column on Form 701-02 and notify a Certification Division representative.

- 115 Ensure that the engine oil level is adequate.

If it is adequate, place a check mark in the “YES” column on Form 701-02. If the oil level is too high or too low, place a check mark in the “NO” column on Form 701-02 and notify a Certification Division representative.

If oil is needed, obtain approval from an EPA Certification Division representative or the vehicle manufacturer's representative. The approving representative must sign Form 701-02 in the space provided.

- 116 Start the vehicle engine.

- 117 Check that the air conditioning, headlights, fan motor, or any other accessory with an on-off switch is turned off unless otherwise specified by the manufacturer.

- 118 Indicate whether the engine start was good, hard (i.e., if it required more than 10 seconds of cranking), or whether it false-started by placing a check mark in the appropriate space on Form 701-02.

If any difficulties were encountered starting the engine, record them in the “Comments” section on Form 701-02.

- 119 Exit from the vehicle and check for holes, cracks, or other sources of leaks where the adapter is connected to the tailpipe. Also, walk around the vehicle and listen for exhaust leaks.

If an exhaust leak is suspected, attempt to locate it and notify a Certification Division representative.

- 120 Warm the vehicle engine to the operating temperature according to the manufacturer's recommended procedure. If the vehicle is not equipped with an operating temperature gauge, operate at idle speed until the radiator tank feels warm to the touch.

- 121 To detect any fluid leaks, check the floor underneath the vehicle. If a fluid leak is suspected, attempt to identify the source and notify a Certification Division representative.

- 122 Shut off the vehicle engine.

200 Ignition Timing Check

If ignition timing is computer-controlled and no entries appear in the ignition timing and rpm sections of the VSR, place a check in "NA" of Form 701-02 and go to Step 300.

201 Connect the Allen tachometer lead to one of the spark plug wires on the engine. Ensure that the arrow on the tach lead is pointing toward the spark plug. For a diesel test vehicle, use the Monarch Phototach or Pioneer Stroboscope.

202 Connect the OTC digital timing light inductive pickup to the spark plug wire identified as Number 1.

Note: If the Number 1 spark plug wire cannot be identified or if the timing light pickup cannot be connected to the spark plug wire, the pickup may be connected to the ignition coil wire.

203 Ensure that the vacuum advance line and any electrical connections are disconnected and plugged if required. In some cases, special procedures may require that a manufacturer's representative be notified to disconnect the required lines or electrical connections.

204 Start the vehicle engine and place the vehicle in the specified gear for checking the ignition timing.

205 Read the ignition timing according to the manufacturer's instructions.

206 Compare the obtained actual timing to the specified VSR timing. This is found in the "IGNITION TIMING" section under "#1" or "#2" on the VSR. A tolerance may also be supplied under "DEG TOL" in the same section.

If the ignition timing is not within the manufacturer's specified tolerance range, notify the Certification Division representative. If no tolerance range is provided by the manufacturer, the ignition timing must conform to within $\pm 2^\circ$ of the manufacturer's timing specification.

207 Record the ignition timing (number of degrees) and indicate if it is before top dead center (B) or after top dead center (A) in the "TDC" space on Form 701-02.

208 Record the timing rpm reading in the applicable space on Form 701-02. If the timing was read in drive, record the rpm in the "Timing rpm in Drive" space. If the timing was read in neutral, record the rpm in the "Timing rpm in Neutral" space.

- 209 If the engine is running, turn it off and connect all vacuum lines or electrical connections which were disconnected during the timing check.
- 210 Indicate the reconnection of any lines and hoses by placing a check mark in the appropriate space on Form 701-02. If nothing was disconnected to check the timing, place an "NA" in the same space on Form 701-02.
- 211 To check the engine idle rpm, start the engine, place the vehicle in the correct gear according to the manufacturer's instructions and read the rpm from the tachometer.
- 212 If the rpm reading was taken in drive, record the reading in the "Idle rpm in Drive" space on Form 701-02. If the rpm reading was taken in neutral, record it in the "Idle rpm in Neutral" space on Form 701-02.
- 213 Compare the observed rpm reading to the rpm specified in the "IDLE" section on the VSR. An rpm tolerance is also specified in the "IDLE" section under "RPM TOL" on the VSR.
- If no tolerance range is provided by the manufacturer, the idle rpm reading must conform to ± 150 rpm of the manufacturer's idle rpm specification. If the observed rpm reading is not within the applicable tolerance range, notify the Certification Division representative
- 214 If the vehicle is a diesel, go to Step 400.

300 Idle CO Screening

- 301 To "Cal check" the Allen 4-Gas Analyzer, select <10> from the "Service Menu" and press <Enter>. The rpm and CO emissions (%) will be displayed on the screen.
- 302 Insert the Allen Analyzer probe into the exhaust pipe adapter.
- 303 If it is not already running, start the engine.
- 304 Watch the Allen rpm meter and increase the engine speed up to 2500 ± 300 rpm; maintain this rpm for 3 minutes.
- 305 At the 3-minute point, record the "High Speed: __% CO" reading on Form 701-02.
- 306 Reduce the rpm and allow the vehicle engine to idle for 30 seconds.

- 307 At the 30-second point, record the “Idle:___% CO” and “Idle rpm” readings on Form 701-02.
- 308 Record the vehicle's fuel gauge reading on Form 701-02. The volume is expressed in eighths of a tank.
- 309 If the vehicle is not a truck or van, go to Step 400. If the vehicle is a truck or a van, leave the probe in the tailpipe for an additional 5-1/2 minutes at idle engine rpm.
- 310 Observe the CO meter to determine the highest CO reading during that period. If at any time the reading exceeds 2.5% CO, notify the VT Scheduling Office. The vehicle will then be scheduled for a CVS Idle Test.
- 311 In the “Comments” section of Form 708-01, record the entry as “Idle CO Screening = XX,” where XX is the highest percent reading during the sampling time.
- 312 Disconnect the timing light and the tachometer from the vehicle.
- 313 Place a check mark in the “Allen 4-gas” space on Form 701-02. If other equipment was used, place a check mark in the “Other” space and identify the equipment used.

400 Drive Shaft and Axle Ratio Inspection

- 401 On Form 701-02, record the tire size. If the actual tire size is different from the size indicated on the VSR, notify the VT senior technician or the Certification Division representative.

When inspecting vehicles with transaxles or front-wheel drive, omit Steps 402-411 and proceed to Step 412. On Form 701-02, under the “Axle Ratio Determination” header, place a check mark next to “NA.”

- 402 To obtain the vehicle axle ratio, chock the non-drive wheels, put the transmission in neutral, ensure that the emergency brake is off, and raise one of the drive wheels off the floor with the jack.

If the technician is required to crawl under the vehicle, ensure proper support of the vehicle by inserting jack stands under the vehicle before proceeding. The technician should use the floor creeper to inspect the underside of the vehicle.

If a vehicle is equipped with a limited slip differential (Positraction), both rear tires must be raised; otherwise, they will not rotate.

403 On a visible area, make a chalk mark on the universal joint and directly across from this mark, on the differential housing, make another chalk mark. The chalk marks will be used to determine driveshaft revolutions to the nearest one-tenth of a revolution.

404 On a raised tire, make a chalk mark on the tire wall at the lowest point on the tire. Make a chalk mark on the floor and directly across from the mark on the raised tire.

405 If a vehicle is equipped with Positraction, rotate the marked tire one complete revolution while counting the number of driveshaft revolutions.

If a vehicle is not equipped with Positraction, rotate the marked tire two complete revolutions while counting the number of driveshaft revolutions. Using the marks on the universal joint and differential housing, count the number of driveshaft revolutions. Determine the driveshaft revolution to the nearest one-tenth of a revolution.

406 Compare the number of driveshaft revolutions to the number in the "Axle Ratio" section on the VSR. If the observed value is within one-tenth of the VSR Axle Ratio, go to Step 407.

If the value is not within one-tenth of the specified ratio, rotate a raised tire 10 times for standard axles or 5 times for Positraction. Using the marks on the universal joint and differential housing, count the number of driveshaft revolutions. Determine the driveshaft revolution to the fraction of a revolution.

Divide the number of driveshaft revolutions by 5 and compare the result to the number under the VSR "AXLE RATIO" header. If this observed value is within one-tenth of the VSR Axle Ratio, go to Step 407.

If the value is not within one-tenth of the specified ratio, notify a Certification Division representative.

407 On the Axle Ratio Chart, under the 2 Wheel Turns header, look up the VSR vehicle axle ratio. Then locate the corresponding 10 Wheel Turns value.

If the VSR vehicle axle ratio is not on the chart, notify the VT senior technician.

408 On Form 708-01, record the corresponding "10 Wheel Turns" value under Axle Measure (columns 48-51) and record a "T" (for turns) under the Units header (column 52).

- 409 On Form 701-02, place a check mark under “Axle Ratio Determination,” indicating that this step has been completed.
- 410 Raise the vehicle with the floor jack and remove the jack stands.
- 411 Lower the vehicle and remove the floor jack.
- 412 Remove all the remaining test instruments and equipment from the vehicle and put them away.
- 413 Inspect the vehicle for damage. On the reverse side of Form 701-02, record all dents, missing trim, scratches, broken glass, or interior damage. If no damage is noted, place a check mark in the space provided on Form 701-02.

500 Verify Test Vehicle Weight

- 501 Back the vehicle onto the Toledo platform scale. The vehicle must be backed onto the scale to obtain the correct axle weights.
- 502 Ensure that the scale system is in the correct mode. If it cannot be determined that the correct mode is selected, push <SUM> on the scale key pad; select 1, 2, 3, and 4; and then push <ENTER>.
- 503 Ensure that the printer power switch is in the “ON” position. If it is not on, push the power switch to the “ON” position; the “PAPER OUT” indicator will start to blink.
- 504 The printer “ON LINE” green light must be illuminated to print. If it is off, press the “ON LINE” button. If the green light is blinking, continue pressing the “ON LINE” button until the green light remains illuminated. If the green light continues to blink, notify a VT senior technician.
- 505 Place Form 701-02 so that the back of the form (the side with the vehicle drawings) is facing the back of the printer and the top is downward. Insert it into the printer, then pull the load lever forward. This will automatically load the paper.
- 506 Estimate the approximate number of gallons needed to fill the vehicle's fuel tank.

Multiply the approximate number of gallons to fill the tank by 6 (approximate fuel weight per gallon) and add the product to the “TOTAL” vehicle weight displayed on the digital readout.

Compare the estimated total weight to the VSR “CURB WEIGHT.”

If the displayed weight is not within 100 pounds of the VSR “CURB WEIGHT,” do not push <PRINT>. Drive the vehicle to the fuel bay, fill the vehicle fuel tank with the correct test fuel, and back it on the scale again.

If the displayed weight is not within 100 pounds of the VSR value, notify a Certification Division representative.

If the estimated full-tank total vehicle weight is within 100 pounds of the VSR “CURB WEIGHT,” push <PRINT> on the scale keypad.

The paper will be advanced to the correct position and the “LEFT FRONT,” “LEFT REAR,” “RIGHT FRONT,” “RIGHT REAR,” “FRONT AXLE,” “BACK AXLE,” and “TOTAL” values will be printed on the form.

Example of weight estimation:

The VSR indicates that the vehicle “CURB WEIGHT” is 3500 pounds with a full tank and the vehicle has a “MAIN-TANK CAPACITY” of 20 gallons. The scale indicates that the vehicle weighs 3350 pounds with a quarter tank of fuel (approximately 5 gallons of fuel in the tank).

Subtracting 5 gallons from 20 gallons would mean that it would require 15 more gallons to fill the fuel tank. Multiply 15 gallons times 6 pounds per gallon. The result is 90 pounds. Add 90 pounds to the 3350-pound total vehicle weight reading. The result is 3440 pounds estimated total vehicle weight. The estimated full-tank weight is within 100 pounds of the VSR “CURB WEIGHT.” If it is not within this tolerance, the Certification Division representative should be notified.

507 Determine the following:

If the vehicle is rear-wheel drive and:

a number is recorded under the VSR “DRIVE AXLE WT FULL TANK” header, continue with Step 508.

a number is recorded under the VSR “DRIVE AXLE WT EMPTY TANK” header, go to Step 509.

If the vehicle is front-wheel drive and:

a number is recorded under the VSR “DRIVE AXLE WT FULL TANK” header, go to Step 510.

a number is recorded under the VSR “DRIVE AXLE WT EMPTY TANK” header, go to Step 511.

508 Rear-wheel drive with full-tank weighing:

Use the estimated gasoline weight from Step 506 or determine the approximate number of gallons needed to fill the fuel tank. Multiply the estimated number of gallons by 6 to determine the additional weight of fuel if the vehicle fuel tank was filled.

Add the product to the "BACK AXLE" weight recorded on Form 701-02 to obtain an estimated weight. If the estimated weight is within 50 pounds of the VSR "DRIVE AXLE WT FULL TANK," go to Step 512.

If the displayed weight is not within 50 pounds of the VSR "DRIVE AXLE WT FULL TANK," drive the vehicle to the fuel bay, fill the vehicle fuel tank with the correct type of fuel, and back it on the scale again.

Remove Form 701-02 from the printer and, in the "Comments" section, record the values displayed on the digital readout for "WEIGHT 3" and "WEIGHT 4."

Add these two values together and compare the result to the VSR "DRIVE AXLE WT FULL TANK." If the displayed weight is within 50 pounds of the VSR value, go to Step 512.

If it is not within 50 pounds of the VSR value, notify a Certification Division representative.

509 Rear-wheel drive empty-tank weighing:

Determine the approximate number of gallons in the tank and multiply that by 6 to determine the weight of the fuel. Subtract the result from the "BACK AXLE" weight recorded on Form 701-02 to obtain an estimated weight. If it is within 50 pounds of the VSR "DRIVE AXLE WT EMPTY TANK," go to Step 512.

If the estimated empty tank rear axle weight is not within 50 pounds of the VSR "DRIVE AXLE WT EMPTY TANK," drive the vehicle to the fuel bay, drain the vehicle fuel tank, put in one gallon of test fuel, and back it on the scale again.

Remove Form 701-02 from the printer and, in the "Comments" section, record the values displayed on the digital readout for "WEIGHT 3" and "WEIGHT 4."

Add these two values together and subtract 6 (which is the weight of 1 gallon of gas) from the total. Compare the result to the VSR "DRIVE AXLE WT EMPTY TANK." If it is within 50 pounds of the VSR value, go to Step 512.

If it is not within 50 pounds of the VSR value, notify a Certification Division representative.

510 Front-wheel drive full-tank weighing:

Do not estimate the number of gallons to fill the fuel tank or add any extra weight to the value displayed on the scale readout.

Regardless of the number of gallons of fuel in the tank, compare the "FRONT AXLE" weight recorded on Form 701-02 directly to the VSR "DRIVE AXLE WT FULL TANK." If it is within 50 pounds of the VSR value, go to Step 512.

If the weight is not within 50 pounds of the VSR "DRIVE AXLE WT FULL TANK," drive the vehicle to the fuel bay, fill the vehicle fuel tank with the correct test fuel, and back it on the scale again.

Remove Form 701-02 from the printer and, in the "Comments" section, record the values displayed on the digital readout for "WEIGHT 1" and "WEIGHT 2."

Add these two values together and compare this reading to the VSR "DRIVE AXLE WT FULL TANK." If the displayed weight is within 50 pounds of the VSR value, go to Step 512.

If it is not within 50 pounds of the VSR value, notify a Certification Division representative.

511 Front-wheel drive empty-tank weighing:

Do not estimate the number of gallons to empty the fuel tank or subtract any weight from the value displayed on the scale readout.

Regardless of the number of gallons of fuel in the tank, compare the "FRONT AXLE" weight recorded on Form 701-02 directly to the VSR "DRIVE AXLE WT EMPTY TANK." If it is within 50 pounds of the VSR value, go to Step 512.

If the weight is not within 50 pounds of the VSR "DRIVE AXLE WT EMPTY TANK," drive the vehicle to the fuel bay, drain the vehicle fuel tank, put in one gallon of test fuel, and back it on the scale again.

Remove Form 701-02 from the printer and, in the "Comments" section, record the values displayed on the digital readout for "WEIGHT 1" and "WEIGHT 2."

Add these two values together and subtract 6 (which is the weight of 1 gallon of gas) from the total. Compare this reading to the VSR "DRIVE AXLE WT EMPTY TANK." If it is within 50 pounds of the VSR value, go to Step 512.

If it is not within 50 pounds of the VSR value, notify a Certification Division representative.

512 On Form 701-02, enter your EPA identification number and date.

600 Post Inspection

601 Park the vehicle in the large soak area with the front of the vehicle facing the dyno cells. The test vehicle is now ready for Test Procedure 702, Preconditioning Fuel Exchange.

602 Place the test packet and keys on the clipboard.

603 Place the clipboard on the windshield or in another visible place on or in the vehicle.

604 If this is a retest, no other data entry is required. If it is not a retest, transfer the information on Form 701-02 to Form 708-01 as follows.

All entries are left-justified. The codes and explanations of the data entries can be found on the back of Form 708-01.

Inspector ID Card B, Columns 07-11

Measured curb weight Card B, Columns 12-16

Units (enter P for “pounds”) Card B, Column 17

Ignition timing Card B, Columns 23-24

Ignition timing A/B (before/after TDC) Card B, Column 25

Gear (used during the ignition timing) Card B, Column 33

% CO idle Card B, Columns 34-36

% CO high speed Card B, Columns 37-39

Idle rpm Card B, Columns 43-46

Gear (used during the idle test) Card B, Column 47

Axle measure Card B, Columns 48-51

Units (enter “T” for turns) Card B, Column 52

Drive axle weight Card B, Columns 66-69

Gauge (vehicle fuel tank volume) Card B, Column 70

9. Data Input

9.1 The Vehicle ID and Test Number are recorded on Forms 701-01 and 701-02.

Note Check marks on Form 701-01 indicate which tests are to be performed.

9.2 The following items are also recorded on Form 701-02:

Odometer

Ignition timing (if required)

Degrees with respect to Top Dead Center (TDC) (if required)

Timing rpm in drive or timing rpm in neutral

Idle rpm in drive or idle rpm in neutral

High speed CO concentration (%)

Idle CO concentration (%)

Idle rpm

Fuel tank volume

Tire size

Comments (if any)

9.3 A check mark indicating compliance, or NA if not applicable, is entered on Form 701-01 for the following:

Retest

Exhaust adapter meets EOD requirements

Fuel drain properly installed

Thermocouple leads operational

Fuel tank heater installed

Hold-down eyelets present, if needed

All vacuum lines and other equipment are properly connected.

Oil level is OK

Start-up performance

All visible under-hood lines are connected

Equipment used

Axle ratio determination

- 9.4 Vehicle damage (if any) is noted on the backside of Form 701-02, along with any applicable comments.
- 9.5 On Form 701-02, the technician who performed the inspection enters his/her EPA identification number and the date.
- 9.6 The information on Form 701-02 is transferred to Form 708-01. All entries are left-justified. The codes and explanations of the data entries can be found on the back of Form 708-01.

Inspector ID..... Card B, Columns 07-11
Measured curb weight..... Card B, Columns 12-16
Units (enter P for “pounds”)..... Card B, Column 17
Ignition timing..... Card B, Columns 23-24
Ignition timing A/B (before/after TDC)..... Card B, Column 25
Gear (used during the ignition timing)..... Card B, Column 33
% CO idle..... Card B, Columns 34-36
% CO high speed..... Card B, Columns 37-39
Idle rpm Card B, Columns 43-46
Gear (used during the idle test)..... Card B, Column 47
Axle measure..... Card B, Columns 48-51
Units (enter “T” for turns)..... Card B, Column 52
Drive axle weight..... Card B, Columns 66-69
Gauge (vehicle fuel tank volume)..... Card B, Column 70

10. Data Analysis

The technician who performs the data analysis must be familiar with this procedure but should not have performed any of the preceding steps. The technician will compare the data recorded on Form 701-02 and 708-01 to the corresponding values on the Vehicle Specification Report and will verify compliance.

Note: The validator for this procedure does not enter their identification number in the “Data Validator ID.” section (Card H) of Form 708-01.

10.1 Verify that the following information has been recorded on Form 701-01:

Vehicle ID

Test number

10.2 Verify that the following information has been recorded on Form 701-02:

Vehicle ID number

Test number

Odometer

Ignition timing (if required)

Degrees with respect to Top Dead Center (TDC) (if required)

Timing rpm in drive or timing rpm in neutral

Idle rpm in drive or idle rpm in neutral

High speed CO concentration (%)

Idle CO concentration (%)

Idle rpm

Fuel tank volume

Tire size

Comments (if any)

Technician's EPA ID number

Date

- 10.3 On Form 701-02, verify that the following information has a check mark indicating compliance, or NA if not applicable:
- Retest
 - Exhaust adapter meets EOD requirements
 - Fuel drain properly installed
 - Thermocouple leads operational
 - Fuel tank heater installed
 - Hold-down eyelets present, if needed
 - All vacuum lines and other equipment are properly connected.
 - Oil level is OK
 - Start-up performance
 - All visible under-hood lines are connected
 - Equipment used
 - Axle ratio determination
 - Vehicle damage
- 10.4 Verify that, if oil was added, the manufacturer's representative or Certification Division representative signed Form 701-02.
- 10.5 Verify that the engine idle rpm is within the manufacturer's specified tolerance range. If no tolerance range is specified, the engine rpm must be within ± 150 rpm of the manufacturer's specification.
- 10.6 If the vehicle is test type 02 (durability), verify that the idle speed is within 150 rpm of the manufacturer's recommended idle speed.
- 10.7 Verify that the ignition timing is within the manufacturer's specified tolerance range. If no tolerance range is provided, the ignition timing must be within $\pm 2^\circ$ of the manufacturer's specification.
- 10.8 Verify that the vehicle total weight is within 100 pounds of the VSR "Curb Weight."
- 10.9 Verify that the drive axle weight is within 50 pounds of the VSR "Drive Axle" weight.

10.10 Verify that Form 708-01, Card B, is complete, free of transcription errors and that any entries in the “Comments” section are complete, specific, and clear. See Step 9.6 for details.

10.11 If inconsistencies or errors are identified in the above steps, notify a VT senior technician.

If there are no omissions, inconsistencies, or errors on the report, enter your EPA identification number and the date in the appropriate spaces on Form 701-02 and file it in the test packet.

If there are no omissions, inconsistencies, or errors on Form 708-01, place it with the vehicle.

11. Data Output

11.1 Form 701-01

11.2 Form 701-02.

11.3 Form 708-01.

12. Acceptance Criteria

12.1 Information pertinent to the testing of the vehicle must be displayed in or on the vehicle in a manner that allows for the data to be read from outside the vehicle.

The displayed information must include the vehicle identification number, vehicle version number, location of the fuel tank drain valve, location of the fuel filler door release, and ignition timing with instructions for reading the timing.

12.2 Gasoline-fueled vehicles must have a type-J iron-constantan thermocouple, 0-500 °F, with at least an 8-inch lead terminating in a male type-J plug for each fuel tank.

12.3 If a gasoline-fueled test vehicle has a fuel tank under which an EPA heat blanket cannot be easily installed, it must be equipped with a fuel tank heating apparatus which is compatible with EPA temperature achievers.

12.4 Vehicles must be fitted with a permanently-affixed exhaust adapter utilizing an Aeroquip Service-Master Flange with a 2.5-inch shell diameter, or equivalent.

- 12.5 The vehicle exhaust system and the exhaust adapter connection must be free of leaks.
- 12.6 The engine idle rpm must be within the manufacturer's specified tolerance range. If no tolerance range is specified, the engine rpm must be within ± 150 rpm of the manufacturer's specification.
- 12.7 Durability vehicles (test type 02) must not exceed the manufacturer's recommended idle speed by more than 150 rpm.
- 12.8 The ignition timing must be within the manufacturer's specified tolerance range. If no tolerance range is provided, the ignition timing must be within $\pm 2^\circ$ of the manufacturer's specification.
- 12.9 The vehicle curb weight must be within 100 pounds and the drive axle weight must be within 50 pounds of the corresponding weights as reported on the VSR.
- 12.10 Front-wheel drive vehicles must be equipped with two sturdy hold-down eyelets, securely fastened to the vehicle frame or bumper. Rear-wheel drive vehicles which do not have bumpers adequate for vehicle restraint must be provided with hold-down eyelets, securely fastened to vehicle frame.
- 12.11 The test vehicle drive-wheel tire size must match the tire size on the VSR.

13. Quality Provisions

- 13.1 The each pad of vehicle weight-scale will be checked annually using a 1000 pound weight. The weight displayed for each pad will be within ± 2 pounds of 1000 pounds.
- 13.2 The vehicle weight-scale is visually checked every 3 months to ensure that the pads are not out of alignment.
- 13.3 Any adjustment made to a test vehicle must first be authorized and witnessed by a Certification Division representative.
- 13.4 Adjustments are made only by a manufacturer's representative and are witnessed by a Certification Division representative. EPA laboratory personnel do not make adjustments to test vehicles.
- 13.5 Manufacturers are required to provide tachometers when unconventional ignition systems are used that cause a normal electronic tachometer to read in error or give no reading.

- 13.6 EPA equipment is used whenever possible.
- 13.7 Form 701-02 is arranged sequentially to help the technician perform the process completely and efficiently.
- 13.8 The technician who performs this process records his/her EPA identification number on all forms and test records related to this procedure, certifying that the data are accurate and complete.
- 13.9 All forms and test records produced by this procedure are validated by a qualified technician who did not record the data. The technician will check the data for completeness, accuracy, and compliance with this procedure. The technician will record his/her EPA identification number on each form and test record he/she validates.
- 13.10 Deviations from this procedure are documented on Form 902-01. In general, these deviations will void the data. However, the customer may choose to accept the data as variant. To do this, the customer must indicate acceptance by signing and dating Form 902-01.

Attachment A

TEST # 9239862

REQUESTOR ID: 62660

NAME:

REPORT TIME: 12:55:24

DATE: AUG 9, 1991

VEHICLE SPECIFICATION REPORT - (TESTNO GEN) - DATE OF ENTRY : 03/12/90

VEHICLE SPECIFICATIONS									
MANUFACTURER	VEHICLE ID / VER	REPRESENTED ONLINE	MODEL CODE	DRIVE CODE	SOURCE				
ANY MANUFACTURER	TEST VEHICLE	1 430 10	SEDAN	REAR DRIVE STR.	LEFT	MANUFACTURER			
VEHICLE TYPE	ACTUAL VEHICLE MODEL	ACT TANK	DRIVE RXL MT	INERTIA TEST	ETH C.D.	SIDE PAN	CO DN HP HP	ACT AC	RUNNING CHG NUMBER
CERT	245 STATION WAGON	92 92	2277P	P 3532P	4000P	3875P	COASTDOWN	1 12.9	V
ODOMETER CORRECTION TIRE & RIN TIRE SPECIFICATIONS INITIAL FACTOR SIZES MFR CONSTR N M N M FT RA DP 7079 ER70X14 DUNLOP RADIAL 45									
ENGINE SPECIFICATIONS									
DISPLACEMENT	BORE	STROKE	RATED HP	ENGINE TYPE	ENGINE CONFIGURATION	NO. CYL.	NO. CARBS	TOTAL FUEL SYS/EN	TURBO/SUPER COMP. COAST
130.0E	3.62E	3.15E		OTTO SPARK	IN-LINE	4		YES	NONE 0.0 10.00
IGNITION TIMING IDLE & CO IDLE #1 #2 DEG TOL. RPM APM TOL. GEAR LEFT RIGHT COMB TOL. RPM RPM TOL. GEAR FAMILY SVST CODE 9B 900 0 1.2 900 NEUTRAL 4CL 4CL:2									
DRIVE TRAIN AND CONTROL SYSTEM SPECIFICATIONS									
AXLE RATIO	N/V	DIFF	AXLE RATIO	DIFF	TRANSMISSION	SHIFT INDIC.	EVAPORATION	FUEL TYPE	
3.79	52.7	MILES	YES	SINGLE LEFT REAR	CLOSED	A-3	-NO ENTRY	CANISTER	UNLEADED <AT EPA-96 RON>
MAIN-TANK AUX.-TANK CAPACITY VOLUME CAPACITY VOLUME 15.3G 6.1G 6.3G 2.5G									
CONTROL SYSTEM TYPES									
FUEL INJECTION	THREE-WAY CATALYST	CLOSED LOOP							
VEHICLE SPECIFICATION COMMENTS * SEE COMMENTS									

Attachment B

Axle Ratio Chart							9-25-2000
2 Wheel Turns	10 Wheel Turns		2 Wheel Turns	10 Wheel Turns		2 Wheel Turns	10 Wheel Turns
2.14	10.70		3.00	15.00		3.92	19.60
2.21	11.05		3.07	15.35		4.08	20.40
2.24	11.20		3.08	15.40		4.10	20.50
2.26	11.30		3.15	15.75		4.11	20.55
2.28	11.40		3.21	16.05		4.22	21.10
2.29	11.45		3.23	16.15		4.30	21.50
2.35	11.75		3.25	16.25		4.38	21.90
2.41	12.05		3.27	16.35		4.56	22.80
2.45	12.25		3.31	16.55		4.62	23.10
2.47	12.35		3.33	16.65		4.63	23.15
2.53	12.65		3.36	16.80		4.27	23.35
2.56	12.80		3.40	17.00		4.36	21.80
2.59	12.95		3.42	17.10		4.44	22.20
2.65	13.25		3.45	17.25		4.86	24.30
2.69	13.45		3.46	17.30		4.88	24.40
2.71	13.55		3.50	17.50		5.13	25.65
2.72	13.60		3.54	17.70			
2.73	13.65		3.55	17.75			
2.74	13.70		3.58	17.90			
2.75	13.75		3.61	18.05			
2.76	13.80		3.62	18.10			
2.78	13.90		3.64	18.20			
2.79	13.95		3.65	18.25			
2.88	14.40		3.69	18.45			
2.93	14.65		3.70	18.50			
2.94	14.70		3.72	18.60			
2.97	14.85		3.73	18.65			
			3.75	18.75			
			3.89	19.45			
			3.90	19.50			
			3.91	19.55			
			3.93	19.65			

[illegible]

Attachment D
Certification Program

Vehicle ID #

Test Number

Test Purpose:

Config. No:

Test Procedure:

MFG Code / Name:

Cert Rep:

Phone Number:

Fuel Type:

Number of Preps

Canister Loading

Evap Request

VTSBED

HWFE

Additional Side Fan Placement

Target Coastdown Time

Tire Size

Twin Role Tire Pressure

psi

Manufacturer Requested Tire Pressure

psi

Main Tank 40% Volume

gallons

Aux. Tank 40% Volume

gallons

Equivalent Test Weight

pounds

Actual Dyno HP

Hp

Set Coefficient A**Target Coefficient A****Set Coefficient B****Target Coefficient B****Set Coefficient C****Target Coefficient C**

Test Request Comment:

Attachment E

Vehicle Inspection

Vehicle ID # _____

Test Number _____

Record the odometer reading _____

_____ Retest - inspection not required; record odometer and sign form only.

_____ Verify that the canister diagram is with the vehicle. If not, do not continue.

_____ Verify that the canister ports and lines are labeled. If not, do not continue.

If "NO" is checked for any of the below, notify the senior technician.

YES NO NA

_____ Exhaust adapter meets specified requirements

_____ Fuel drain properly installed

_____ Thermocouple leads operational

_____ Hold-down eyelets present, if needed

_____ Oil level OK. If oil level is low, notify the VT senior technician.
Obtain signature from a Cert. Division or manufacturer's representative._____
(Certification/Manufacturer's representative signature)

_____ Start-up Good If not, contact:

Fuel gauge indicates (Volume): _____ /eighths

Tire size: _____

Axle Ratio Determination:

_____ NA

_____ Drive shaft revolutions are within one-tenth of VSR Axle Ratio. Record the Axle Chart number on Form 708-01.

Attachment E Continued

Vehicle Inspection

Vehicle ID # _____

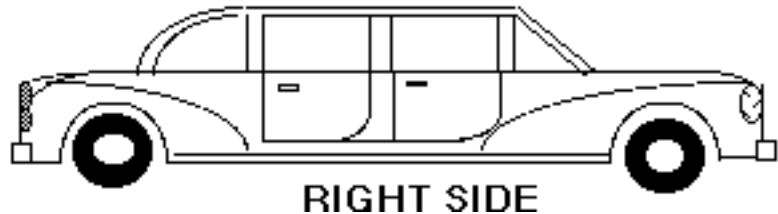
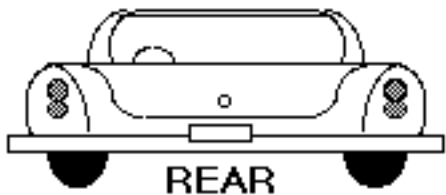
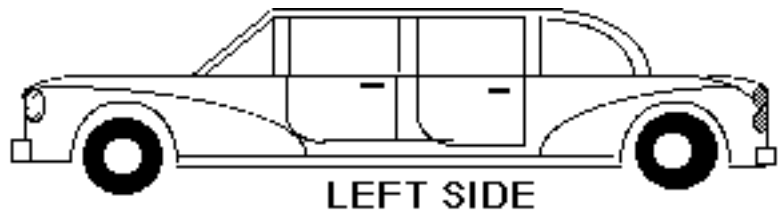
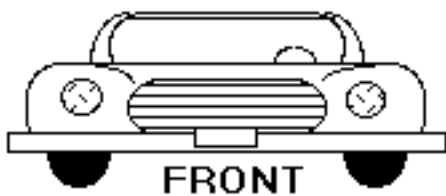
Test Number _____

Indicate all damage - circle the location and use code listed below.

_____ No vehicle damage noted

- | | | | |
|-----------------|-----------------|----------|-----------------|
| 1. Dent | 3. Scratch | 5. Chip | 7. Crack |
| 2. Trim missing | 4. Broken glass | 6. Stain | 8. Other: _____ |

Describe any interior damage: _____



Vehicle weight: _____

Comments: _____
_____**Signatures**

I have performed all steps in accordance with the requirements of Test Procedure 701.

Technician ID #: _____ Date: _____

The data entries are correct and meet the requirements of Test Procedure 701.

Verified by: _____ Date: _____

Attachment F

Vehicle Weight Verification Flow Chart

